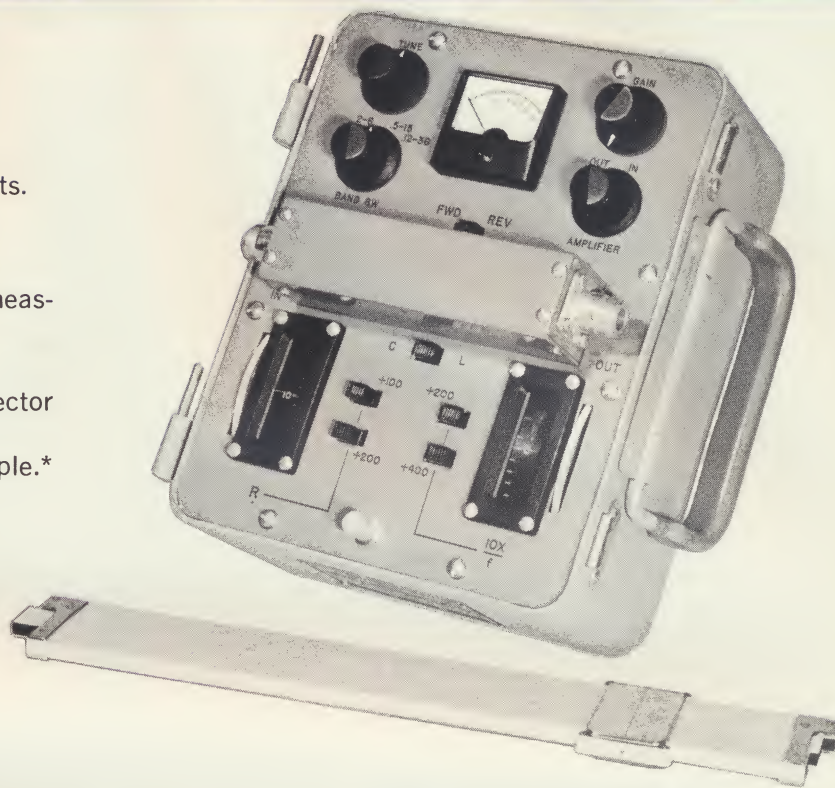


HIGH FREQUENCY OPERATING IMPEDANCE BRIDGE, MODEL OIB-2

- Greatly simplifies RF impedance measurements.
- Operates from 2 - 30 mc.
- Handles up to 1 kw through power.
- No signal generator or detector required when measuring under power.
- Very low insertion effect.
- Can be used with generator and external detector as normal bridge.
- Based on a new impedance measuring principle.*



DESCRIPTION

The Model OIB-2 H.F. Operating Impedance Bridge contains a complete impedance measuring circuit and a sensitive null detector. When used with a transmitter or high power signal generator, no external detector is required. The bridge can be inserted in any part of a high frequency antenna system to measure the "operating" impedance of individual radiators, network inputs, transmission line terminals, etc. This "operating" impedance cannot be measured by conventional impedance bridges because the antenna characteristics are disturbed when the bridge is inserted in the circuit.

The insertion effect of the Model OIB-2 H.F. Bridge is equal to only 5" of 150-ohm transmission line. An external detector jack is provided so that the bridge can be used with a low power signal generator and sensitive communications receiver as a normal impedance bridge for antenna or laboratory RF measurements. A transistorized amplifier is employed in the null detector circuit.

The bridge is housed in a deep-drawn aluminum instrument case and is supplied with a cover and carrying handle. Heavy duty construction is used throughout to insure long, dependable performance of the bridge under rugged field conditions. The R & X dials are individually calibrated and engraved.

SPECIFICATIONS

Frequency Range: 2 mc to 30 mc.

Thru Power Rating: 1 kw with VSWR 3.

Insertion Effects: Equal to 5" of 150-ohm line.

Functions: Direct reading in R, -400 to +400 ohms; Direct reading in X (10 mc) -600 to +600 ohms; Measures VSWR, $Z_0 = 0$ to 400 ohms. Indicates relative forward and reflected power.

Accuracy: R & X, $\pm 5\%$, ± 1 ohm.

RF Source: Transmitter, transmission line, etc., or signal generator with adapting connector.

Detector: Internal for power sources, connector on front panel for external detector when used with signal generator.

Terminals: Input and output are type N receptacles. 6" output clip leads supplied with bridge. External detector connection is BNC.

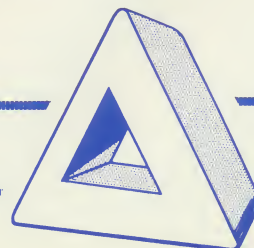
Dimensions: 9" x 7" x 6¼" deep.

Weight: 8 lbs.

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OPERATING IMPEDANCE BRIDGE, MODEL OIB-1



DESCRIPTION

The Model OIB-1 Operating Impedance Bridge measures the operating impedance of the individual radiators, network inputs, transmission line terminals, and common point of directional antennas **while they are functioning normally and under power**. This "operating impedance" cannot be measured by normal impedance bridge methods because the antenna characteristics are disrupted when the bridge is inserted in the circuit. The OIB-1 thus satisfies a critical requirement long felt by consulting and broadcast station engineers. It has many applications in other fields that cannot be duplicated by any instrument.

The OIB-1 is inserted directly in series with the transmission line, network, or antenna terminals. The transmitter power is applied and a bridge balance is accomplished by manipulating the R & X dials on the face of the bridge. The balance is indicated by a null reading on a meter which is mounted on the front panel of the bridge. The operating resistance and reactance is then read directly from the dials on the bridge. The SWR on a transmission line can be read directly from a scale on the meter face.

- Measures "in circuit" operating impedance — 500 kc to 5 mc.
- Handles through power up to 5 kw.
- No signal generator or external detector required for measurement under power.
- Can be used with signal generator and receiver as a normal bridge.
- Measures negative impedance loads.
- Ideal for use in adjusting multi-tower directional antennas.
- Based on new principle*.

* Patent Pending.

SPECIFICATIONS

Frequency Range: 500 kc to 5 mc.

Thru Power Rating: 5 kw with VSWR 3.

Insertion Effects: Equal to 9" of 150-ohm line.

Functions: Direct reading in R, -400 to +400 ohms; Direct reading in X, -300 to +300 ohms; Measures VSWR, $Z_0 = 0$ to 400 ohms. Indicates relative forward and reflected power.

Accuracy: R & X $\pm 5\%$, ± 1 ohm. Dials individually calibrated and engraved.

RF Source: Transmitter, transmission line, etc., or signal generator with adapting connector.

Detector: Internal for power sources. Connector on front panel for external detector when used with signal generator.

Terminals: Input and output are large UHF receptacles (UG-357/U). 12" input and output clip leads are supplied with bridge. External detector connector is BNC.

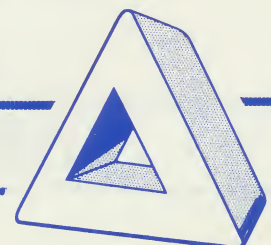
Dimensions: 12½" x 9½" x 5¼" deep.

Weight: 16 lbs.

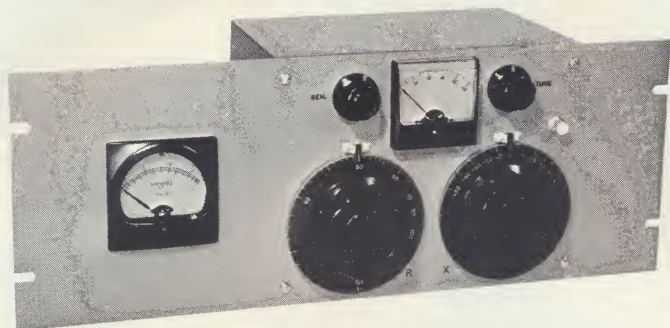
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COMMON POINT IMPEDANCE BRIDGE MODELS CPB-1 & CPB-1A



An instrument for permanent installation in the common point of a directional antenna system. Permits the common point resistance & reactance to be measured during normal operation without transmitter shutdown. Panel ammeter reads common point current so that direct antenna power can be determined.

DESCRIPTION

The Delta Electronics Model CPB-1 and CPB-1A Common Point Impedance Bridges are operating impedance bridges similar to the Model OIB-1, but designed for permanent installation in your phasing equipment at the antenna common point. The CPB-1 will handle common point powers up to 5 kw with 100% amplitude modulation on a continuous basis. The CPB-1A is designed for transmitter powers up to 50 kw. Both instruments have two 4" dials calibrated directly in resistance and reactance. A panel meter is provided for a null detector. The R & X dials are manipulated as a normal bridge while the transmitter is operating at full or reduced power to give a null indication on the panel meter. The value of the common point resistance and reactance can then be read directly from the two dials.

It has been found that many directional antennas have common point impedances which vary from time to time due to seasonal changes in the ground system and minor tuning drift of the antenna parameters. On many occasions, it was found from re-measurement of the common point impedance that the station had been transmitting with somewhat less than full power for some time because of these changes. The CPB-1 and CPB-1A permit the station operator to determine the common point impedance at any time, even during normal operating hours. By minor adjustment of the common point resistance control, he can maintain his radiated power at the full license value at all times. He also has a method of detecting changes in his antenna system which effect the common point. This may alert him to equipment faults and prevent citations for antenna misadjustment. The development of the CPB-1 and CPB-1A has thus satisfied a requirement long expressed by leading broadcast station engineers.

SPECIFICATIONS

Frequency Range: 500 - 1650 kc.

Power Rating: CPB-1 - 5 kw - 100% amp. mod. continuous.
CPB-1A - 50kw - 100% amp. mod. continuous.

Resistance Range: 30 - 100 ohms.

Reactance Range: ± 50 ohms (1000 kc)

Accuracy: Resistance $\pm 2\%$ ± 1 ohm.
Reactance $\pm 5\%$ ± 1 ohm.

(Provision is made for your consultant to adjust the calibration to agree exactly with your licensed resistance value).

R.F. Source: Your transmitter operating at normal or reduced power acts as source—no generator is required.

Detector: Tuned internal detector with 25 ua panel meter—no external detector is required.

R.F. Ammeter: Panel hole is provided for Weston Model 308, $3\frac{1}{2}$ " square ammeter. A meter recessing bracket is supplied for high power applications. A matching meter for your power and resistance can be supplied.

Terminals: Screw terminals or standoff insulators at rear of bridge box for connection to tubing, strap, or jumper to coax is provided.

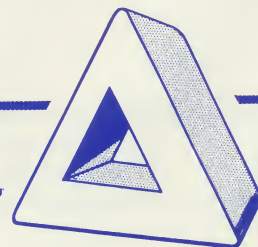
Mounting: Standard 7" x 19" engraved gray rack panel—can be supplied without panel for mounting behind your phasor panel (drill template supplied).

Dimensions: Bridge box without panel:
Height: 7" Width: 9" Depth: $9\frac{1}{4}$ "
Panel dimensions: 7" x 19".

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TUNABLE NOTCH FILTER, MODELS TNF-1 and TNF-2



Passive Tunable Notch Filter for use in the 2-30 MC frequency range between a receiver or multicoupler and the receiving antenna where transmitters are operated in close proximity. The TNF has proven to be a useful tool in measuring harmonic distortion of a given RF signal.

DESCRIPTION

The TNF tunable notch filter is designed on the "bridged T" filter principle. That is, a resonant circuit interrupts the transmission line and is tuned to the frequency to be rejected. A variable shunt resistance is connected from the center of the resonant circuit to ground thus providing a means of varying the null depth. The TNF is designed to operate over the frequency range of 2 to 30 mcs in five bands of frequencies. The coils that make up the resonant circuits in each of the five bands are mechanically mounted in a rotating turret. A sixth position is provided on the turret to take the filter section out of the antenna line.

To measure the harmonic distortion of an RF signal, the TNF is tuned to the fundamental frequency which is then nulled 50 db. The remaining RF signal is the harmonic content of the signal.

The TNF and the RMC 2x4 multicoupler are available as a combined unit mounted on one chassis.

SPECIFICATIONS

Frequency Range: 2-30 mcs. in 5 bands

Nominal Impedance: 70 ohms

Residual Insertion Loss, (off rejected frequency):
1.5 db

Residual VSWR, (off rejected frequency): 1.5:1

Overall Dimensions: 5¼" H x 19" W x 7" D

Null Depth: Variable to 50 db

Controls: Band switch, variable frequency dial and null depth.

Band Switch Positions:

1. Filter out of circuit
2. Band 1: 2-3.5 mcs.
3. Band 2: 3.4-6 mcs.
4. Band 3: 5.9-10.2 mcs.
5. Band 4: 10-18 mcs.
6. Band 5: 17-30 mcs.

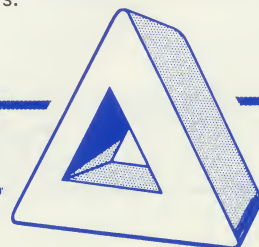
Maximum Recommended Input:
RF Voltage: 50 volts RMS

3 db Null Width: +12% maximum

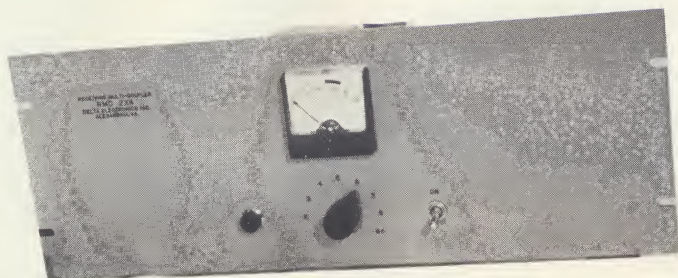
Input and Output Connectors: BNC on front or rear of chassis.

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RECEIVING ANTENNA MULTICOUPLER — MODEL RMC — 2 X 4



- High Performance
- Excellent Overload Characteristics
- Excellent Intermodulation Characteristics
- High Back-to-Front Ratio
- 50 db Isolation between Outputs
- Low Noise Figure

DESCRIPTION

Antenna coupler RMC—2 x 4 consists of a pair of broadband antenna coupling devices to provide optimum coupling between two receiving antennas and as many as eight communications receivers in the 2 to 30 mcs frequency range. An internal RF filter suppresses signals at frequencies outside of this range. The RMC—2x4 provides a minimum of interaction between receivers as well as minimum re-radiation into the antennas. Particular care has been taken in the design of this unit to provide the maximum in overload characteristics in the presence of high intensity RF signals while keeping intermodulation, cross-modulation and noise to minimum. Front panel metering is provided to enable the operator to make dynamic tests of all amplifier stages, power supply, and RF input levels.

The RMC—2 x 4 and the TNF Notch Filter are available as a combined unit mounted on one chassis.

SPECIFICATIONS

Electrical Frequency Range: 2 to 30 mcs.

Number of Inputs: 2

Number of Outputs: 8 (4 for each input)

Input and Output Impedance: 70 ohms unbalanced

Gain: $+1 \text{ db} \pm 2 \text{ db}$

Input VSWR: Less than 1.5:1 between 3 and 30 mcs.

Output VSWR: Less than 1.5:1 between 2 and 30 mcs.

Noise Figure: The average noise figure for any channel is less than 8.

Intermodulation Characteristics: Cross modulation or non-linear distortion products appearing at the output terminals are no greater than 50 db below two 0.40 volt reference signals at any two frequencies within the operating range.

Filtering: A high pass filter is provided with a rejection of at least 60 db below 1.5 mc. A low pass filter provides a rejection of at least 40 db above 40 mc.

Overload Characteristics: Capable of accepting input level of at least 2.0 volts RMS at frequency f1 without causing the desired frequency f2 (10 MV RMS) to drop more than 3 db.

Back-to-Front Ratio: Greater than 50 db from 2 to 30 mcs.

Isolation between Connected Receiver Outputs: The output-to-output isolation is greater than 50 db.

Uniformity of Output Levels: The extremes of variation for all channels is plus or minus 2 db.

Metering: A front panel meter with switching circuit is provided to permit metering total plate current of each of the output stages and the power supply B+ circuit.

Primary Power: 117/220 volts; 50-60 cps; single phase; 45 watts; better than 90% power factor.

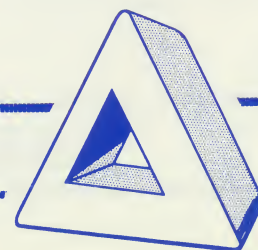
Overall Dimensions: 5 1/4" H x 19" W x 12" D

Terminals: Input and Output terminals are BNC type.

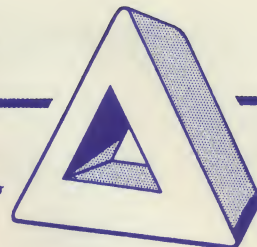
Mounting: Standard 19 inch rack mounting.

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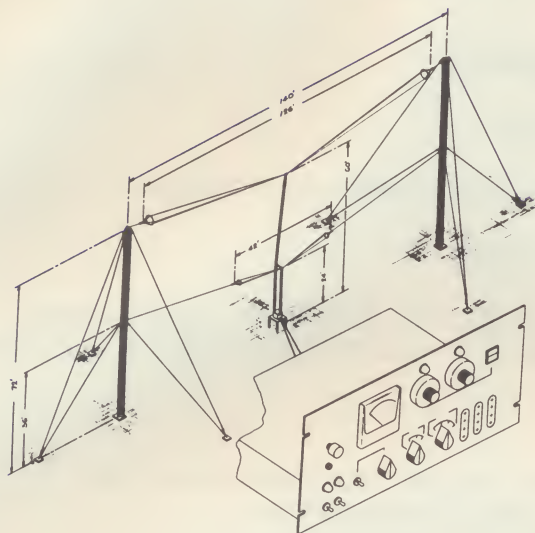


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DELTA MODEL HFAS-3

HIGH FREQUENCY

ANTENNA SYSTEM

DESCRIPTION

The Delta Electronics Model HFAS-3 is a remotely tuned antenna system for communications applications in the 3 - 30 mc frequency range. The system employs two wide band dipole antennas and a remotely tuned coupling network to provide favorable radiation patterns and exact impedance matching at any frequency in the 3 - 30 mc range. The input impedance is 50 ohms (1-5/8" EIA flange fitting is provided). The power rating of the HFAS-3 is 5 kw average, or 20 kw PEP over the entire frequency range. The coupling network utilizes low loss inductors and vacuum capacitors, and provides an excellent impedance match to the 50-ohm input line.

Two four-wire cage type dipoles are employed, and two four-wire 300-ohm transmission lines are furnished to connect the dipoles to the coupling unit. The appropriate dipole is selected by remotely controlled vacuum relays contained within the network housing. The antennas and transmission lines, complete with necessary strain insulators, are pre-assembled and furnished as part of the HFAS-3 antenna system.

The remote control unit is contained in an 8-3/4" panel for standard 19" rack mounting. The control unit contains two master 10-turn potentiometers to control the variable inductors and variable capacitor. An illuminated pushbutton switch is provided for operating the antenna change relays. The control unit includes a VSWR interlock and metering circuit. The VSWR interlock circuit will interrupt the transmitter when the VSWR exceeds a preset value. A directional coupler unit is provided for installation at a location convenient to the transmitter. After initial adjustment, any of four preset frequencies can be selected by a front panel switch.

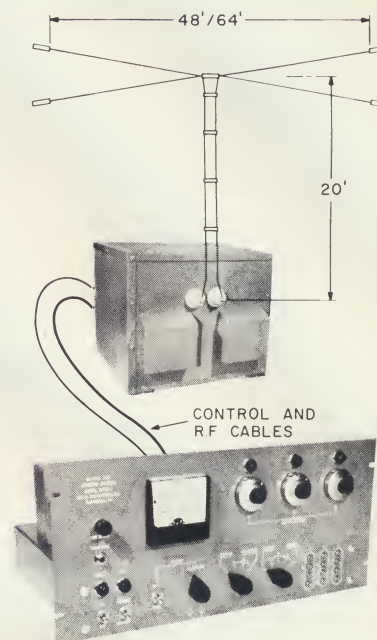
SPECIFICATIONS

1. Frequency Range
3 - 30 mcs.
2. Input VSWR
Less than 1.10 at any frequency in the specified range.
3. Power Rating
5 kw average - 20 kw peak.
4. Coupling Network Efficiency
90% or greater over entire frequency range.
5. Master Remote Tuning Controls
Two servo controls for tuning network components, plus pushbutton switch for selecting dipole antennas.
6. Preset Tuning Controls
Front panel screwdriver-adjusted controls for preset tuning of any four frequencies.
7. VSWR Indicator
Panel meter on control unit provides direct readout of VSWR. External directional coupler furnished complete with EIA 1-5/8" coaxial flange fittings.
8. Transmitter Interlock
VSWR interlock system removes D.C. ground on center of coaxial line when reflected power level exceeds a preset amount.
9. Dimensions
Coupling Unit: $24\frac{1}{4}"$ x $20\frac{1}{4}"$ x $19\frac{1}{4}"$
Control Unit: 8-3/4" standard rack panel
10. Control Cable
200-ft. control cable included with system. Longer cables (up to 600 feet) can be supplied on special order.
11. A. C. Power Requirements
115-volt - 50/60 cycles - 100 watts
12. Supporting Structures
Supporting towers and halyards are not furnished as part of the system, but are available as an accessory item.

HFAS - 1 HIGH FREQUENCY ANTENNA SYSTEM

DESCRIPTION

The Delta Electronics Model HFAS-1 Antenna System utilizes a two-wire horizontal fan dipole with an overall length of 48 ft. to cover the 4-30 mc high frequency range. A second antenna with a length of 64 ft. is provided for applications in the 3-22.5 mc range. A 20-ft. length of two-wire transmission line connects the appropriate antenna to the coupling unit which contains a variable balanced pi network and a balun transformer for providing an impedance match to a 50-ohm coaxial transmission line. The coupling network is capable of providing an excellent match (VSWR less than 1.1) at any frequency in the specified operating ranges. The control unit contains three precision dials and solid-state servo systems for accurate control of the elements of the pi network, and a VSWR monitor for use in initial tuning and as a monitor for routine operation. Four sets of preset controls are provided. After initial adjustment, operation on any four frequencies is provided by a selector switch. The control unit also provides a VSWR transmitter protection interlock circuit for interrupting the RF power when the VSWR exceeds a preset value.



SPECIFICATIONS

Frequency Range: 48-ft. Antenna — 4-30 mc.
64-ft. Antenna — 3-22.5 mc.

Power Rating: 1,000 Watts (CW or PEP) 3.5-30 mc, decreasing to 600 watts at 3.0 mc.

Input Impedance: 50 ohms (type N connector); with VSWR ≤ 1.10 .

Coupling Unit: Weatherproof housing, blowers operate automatically when required.

Size: 20 $\frac{3}{8}$ " x 25" x 17 $\frac{7}{8}$ ".

Weight: 75 lbs.

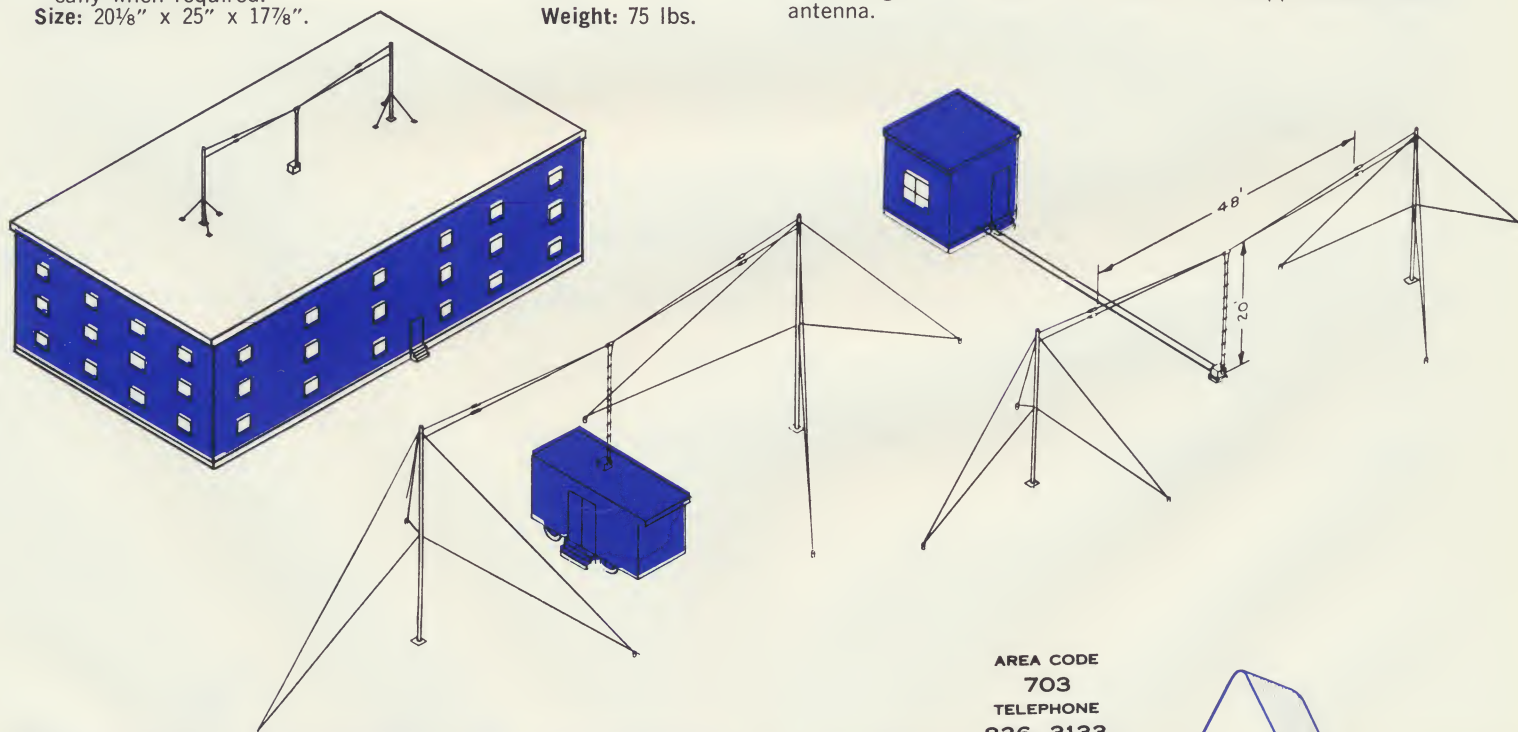
Control Cable: Weatherproof multiconductor. Length 200 ft., or as specified.

Control Unit: Contains SWR monitor, 3 solid-state precision servo-systems for tuning pi network, and screwdriver set controls for four preset channels. Master controls provide an additional channel for quick selection of 5 operating frequencies.

Size: 8 $\frac{3}{4}$ " rack-mount.

Weight: 15 lbs.

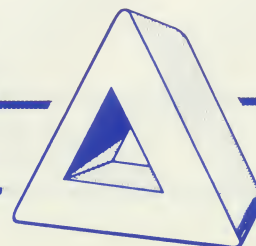
Antennas: Two fan dipoles (2-wire) with lengths of 48 ft. and 64 ft. 20-ft. lengths of 2-wire transmission line supplied with each antenna.



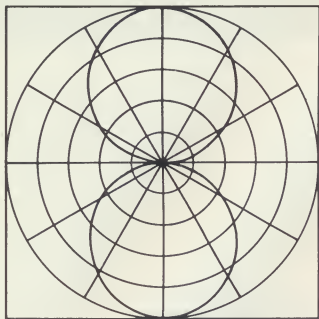
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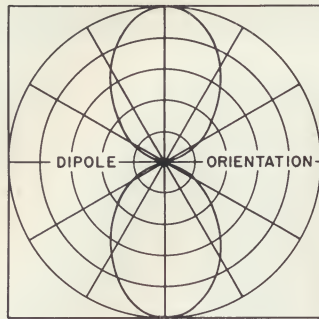
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HORIZONTAL RADIATION PATTERNS

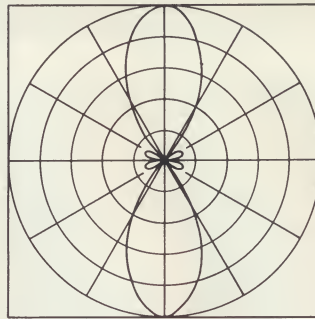


3 - 6 MC
4 - 8 MC

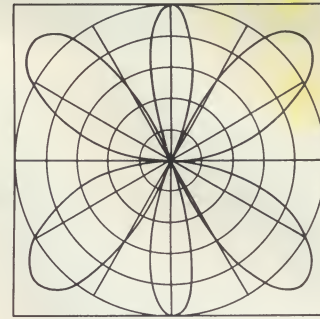


12 MC
16 MC

— 64 FT. ANTENNA —
— 48 FT. ANTENNA —

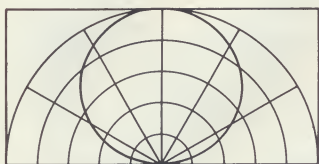


16.5 MC
22 MC

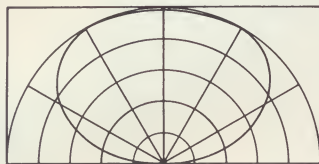


21 MC
28 MC

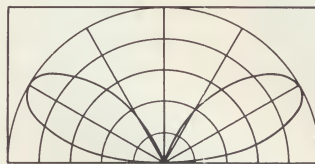
VERTICAL RADIATION PATTERNS (Height 22.5')



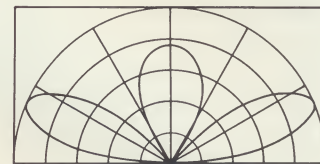
3 - 6 MC



12 MC

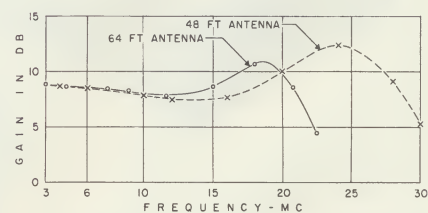
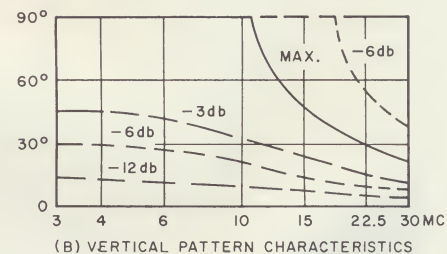
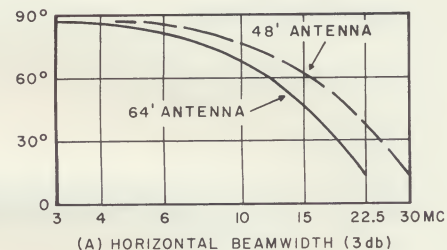


22 MC



28 MC

- COVERS ENTIRE 4-30 MC RANGE WITH 48-FT. HORIZONTAL DIPOLE ANTENNA, OR 3-22 MC WITH 64-FT. DIPOLE.
- ANTENNA HEIGHT ONLY 20 FT. ABOVE COUPLING UNIT. MOUNT COUPLING UNIT AT GROUND OR ROOFTOP LEVEL.
- POWER RATING 1000 WATTS CW.
- HIGH EFFICIENCY COUPLING NETWORK MATCHES TO 50-OHM COAXIAL LINE, $SWR < 1.10$.
- PROVIDES RADIATION PATTERNS AND POWER GAIN SUITABLE FOR MANY POINT-TO-POINT COMMUNICATION APPLICATIONS.
- REMOTE CONTROL UNIT PROVIDES PRECISION SERVO TUNING WITH SWR MONITOR FOR INDICATING CORRECT TUNING.
- FOUR SETS OF PRESET TUNING CONTROLS PROVIDED FOR SIMPLE, FAST DAILY FREQUENCY CHANGES.
- ANTENNA SYSTEM CAN BE INSTALLED QUICKLY AND EASILY IN SMALL SPACE.
- MAST KIT FOR GROUND, ROOFTOP, OR TRAILER INSTALLATIONS AVAILABLE AS ACCESSORY ITEM.



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